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Development Economics: Theory, Empirical Research and Policy Analysis
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Chapter 7
Households

The goal in development is to improve the well-being of many people, especially among the poor. People live in households that are highly diverse, owning much land or little, being barely literate or college educated, living in cities or remote rural communities, engaged in many markets or few. Within households, individuals differ in gender, age and other attributes. An important theme of this book is that diverse people experience differentiated impacts of development policies and other changes in socio-economic conditions. If we are to identify a set of policies that promote rising living standards for everyone, we must understand this differentiation both across households and within households.

This chapter develops tools for analyzing differentiation across and within households in two steps. First, we recognize that while the abstract "consumers", "labor suppliers" and "producers" of Chapter 6 engage in only one set of decisions at a time, real world households may engage *simultaneously* in consumption, time allocation and (often) production decisions. This gives rise to tremendous differentiation across households in the nature and extent of their involvement in diverse markets and non-market institutions. The first half of the chapter develops a framework for use in studying the differentiated impacts of socio-economic change across households of different types, and demonstrates its usefulness for studying the impact of the recent global food price crisis on the poor.

Second, we recognize that while the abstract decision-makers of Chapter 6 (and the households of the first half of this chapter) are "unitary" decision-makers, who seek simply and without conflict to maximize well-being as defined by a single set of preferences, real world households are made up of multiple individuals, whose interests and power may vary, and who may engage in both cooperation and conflict as they work out household decisions. The second half of this chapter moves beyond the unitary decision-making framework to explore more complex models of how households achieve decisions, and demonstrates the potential importance of these extensions for analyzing policy efforts to improve the relative standing of women.

Unitary household theories: From "consumers," "labor suppliers" and "producers" to "households"

A motivation. Advocates for the developing world have long argued that rich countries' protection and subsidization of their agricultural sectors burdens developing countries by driving down world food prices, thus limiting the ability of the poor in developing countries to profit from agricultural exports (Tokarick, 2008). Such advocates see higher global food prices as *good* for the world's poor. Yet the dramatic increase in global food

prices that reached a peak in 2008, igniting riots in many parts of the developing world, was deemed a "global food crisis", which the World Bank estimated to be responsible for un-doing the previous ten years' worth of global poverty reduction (World Bank, 2008). That is, suddenly it appeared that higher global food prices are *bad* for the world's poor. How do we make sense of the apparent contradiction between these two views? What do we learn from the events of 2008 about the likely impacts on the world's poor of agricultural market liberalization in the developed countries? What empirical evidence should we gather to understand better the link between global food prices and global poverty? The household models exposited in the next four sections provide a useful framework within which to analyze such questions.

Diversity of households. We differentiate our discussion across four broad archetypal categories of households, which we call wage labor households, farm households, non-farm enterprise households and incapacitated households. We point out the importance of diversity both within and between these categories.

Unitary households. The models we develop here in the first half of the chapter are called "unitary" household models, because they treat the entire household as if it were a single or unitary decision-maker, simply maximizing a single utility function. This contrasts with the models of household decision-making addressed in the second half of the chapter, in which we recognize explicitly that households are made up individuals with distinct preferences, who may disagree over the best use of household resources.

Wage labor households

In most developing countries between one-third and two-thirds of workers earn their income as wage employees. The many **wage labor households,** for whom the main source of income is wage income, include some well-off households who earn income in high-wage, skilled labor markets. Many of them are among the poorest, however, earning income primarily by selling their low-skill labor for low wages, whether in rural or urban labor markets.

Wage labor households engage simultaneously in decisions regarding consumption *and* time allocation, and are involved simultaneously in markets for consumer goods and services *and* labor markets. This has two important implications. First, when studying the impact on the *behavior* of these households of any single change in price, wage or non-labor income, we must remember the inter-relatedness of all choices. A change in the price of food (which affects only consumption choices in basic consumer theory) may affect labor supply as well as consumption choices, and a change in non-labor income (which affects only time allocation in basic labor supply theory) is likely to affect consumption choices as well as labor supply. Second, when studying policy impacts on the *well-being* of these households, we must acknowledge that policies often induce changes in multiple markets and institutions simultaneously. We must study joint effects on well-being of all such changes.

Endowments, full income and allocation choices. Here we build on the basic theories of consumption and time allocation choices (presented in Chapter 6) for studying the well-being and behavior of a stylized wage labor household. To facilitate study of this section, we summarize key notation in Table 7.1.

Table 7.1
Notation Employed in Discussion of Wage Labor Households

M = endowment of non-labor income (pesos)
T = total time endowment
w = wage in pesos per unit of time
S = labor supply time
H = home time
F = food consumption (bags)
N = non-food consumption (bags)
P_f = per-bag price of food per unit
P_n = per-bag price of non-food

We can think of a **wage labor household** as both a labor supplier and a consumer. As a *labor supplier* the household is endowed with non-labor income, M, and total time available (after accounting for sleep and other life-sustaining activities) T. It must allocate the time across wage labor time, S, and home time, H, subject to the total time constraint that

(7.1) $S + H = T.$

As a *consumer,* the household must choose the quantities of consumption of various goods and services subject to a budget constraint. If the household faces a wage of w per hour of labor supplied (S), if the only two goods relevant to consumption decisions are food (F) and non-food (N), and if the household faces per-unit prices P_f and P_n, then the **budget constraint** may be written

(7.2) $P_f F + P_n N = M + wS.$

The left hand side of this equality is the household's total **consumption expenditure** while the right hand side is the household's **income** (Y)**,** including both labor income and non-labor income. The household seeks to maximize utility as a function of F, N and H, $U(F,N,H),$ subject to constraints (7.1) and (7.2). Clearly, the time allocation and consumption choices are inter-related, because the outcome of the time allocation choice determines the level of income that constrains the consumption choice.

With a little re-arranging, we can re-state this joint decision problem in a simpler way, which allows us more easily to see how the insights of Chapter 6 might be brought to bear on the analysis. Substituting $S=T-H$ (from 7.1) into (7.2) and re-arranging, we find that

(7.3) $M + wT = P_f F + P_n N + wH.$

The left hand side represents the total quantity of cash the household would have if it allocated its full endowment of time to earning cash. Economists call this total cash value of the household's endowments the **wage labor household's full income.** While a household's *actual* income is determined in part by the household's choice regarding labor supply, the household's *full* income is entirely outside the household's current control. It may vary greatly across households, who differ in the level of wages they face (as a result of differences in skills or strength of local labor markets), numbers of able-bodied workers, hours available for work and home time (after hauling water and fuel), and non-labor income. But the wage labor household takes the value of its full income as given, much as the simple "consumer" of Chapter 6 takes actual income as given.

The right hand side of (7.3) indicates the three uses to which the wage labor household puts its full income: consumption of food, consumption of non-food, and enjoyment of home time. We can think of these as the three "goods" the household "buys" with its full income. Extra units of F and N may be purchased explicitly at prices P_f and P_n. An extra unit of H may be "purchased" implicitly by devoting an hour to home time rather than wage labor, thereby causing actual income to fall by w relative to full income. It is as if the household chooses values for three consumption quantities, F, N and H, to maximize $U(F,N,H)$ subject to the "full income budget constraint" (7.3).

Impacts of income and price changes on behavior. If we think of wage labor households as maximizing $U(F,N,H)$ as just described, the basic theories of consumption and labor supply described in Chapter 6 require only very modest modification for use in analyzing the impacts of income and price changes on the behavior of wage labor households. Increases in M or T, which increase full income without modifying the prices of the three "goods", are like increases in total income (Y) in the basic consumer choice model. Hence if F, N and H are all normal goods (as defined in Chapter 6), an increase in M or T leads the household to consume more of F, N and H, and an increase in P_f (holding w and P_n constant) would reduce F. The food price increase might cause H to rise, fall or remain constant, depending on whether food and home time are substitutes, complements or independent in consumption. As in the basic labor supply model, an increase in w increases both full income and the "price" of leisure. Rising w might thus bring both an income effect, tending to increase H and reduce S, and a substitution effect, tending to reduce H and increase S.

Purchasing power impact of food price increase. In Chapter 6's discussion of basic consumer theory we examined the approximate magnitude of an income transfer to a food consumer implicit in a food price reduction. Following the same logic, we can discuss the approximate magnitude of the *tax* on a wage labor household implicit in an increase in the price of food by asking: If this household made no changes in its choices regarding F, N and S, while experiencing an increase in the price of food from p_1 to p_2, by how much would its total income Y now fall short of its consumption expenditure $(P_f F + P_n N)$? Let's give the name **purchasing power reduction** to any gap that opens up between the total consumption expenditure required to maintain current consumption and the household's actual income. When the price of food rises, the total consumption expenditure required to maintain current real consumption rises by $(p_2-p_1)F_1$, while income remains unchanged. This incipient gap, which the household must close, is like a

tax to which the household must respond either by giving up some consumption of food or non-food (reducing expenditures) or by giving up some home time (in order to work longer hours and increase cash income). Clearly the tax is larger for households that initially spend more on the relevant food. If ρ is the percentage increase in the price of food and f is the fraction of income the household typically spends on food, then the incipient effect of the increase in food price is to reduce purchasing power by approximately ρf percent. (This is only approximate, because the consumer is likely to consume less of the relevant food after the price increase, and may also adjust labor supply)

Purchasing power impact of simultaneous increases in food price and wage. What if this wage labor household lives in a rural economy where increased food prices eventually spur expansion of local agricultural production and employment, causing wages to rise? To understand the longer-run impacts on the household's well-being we must take into account induced increases in wages as well as the initial price increase. If the price of food rises from p_1 to p_2, the consumption expenditure required to maintain the household's current consumption rises by $(p_2-p_1)F_1$, but if the wage also rises from w_1 to w_2, then the household's actual income would rise by $(w_2-w_1)S$. As before, if the price of food rises by ρ percent, and the household devotes a fraction f of consumption expenditure to food purchases, then the consumption expenditure required to maintain current consumption rises by ρf percent. If each percentage point of increase in the price of food ultimately gives rise to an increase of ε percentage points in the wage (where ε is the elasticity of the wage with respect to the price of food), and if the household derives a fraction ω of its income from wage labor, then the income available for financing consumption expenditure rises by $\rho\varepsilon\omega$ percent. The net purchasing power impact of the price and wage change is to reduce the household's purchasing power by approximately $\rho(f-\varepsilon\omega)$ percent.

The net purchasing power impacts of price and wage increases may differ greatly across wage labor households and circumstances. Consider an increase in the price of wheat. If wheat takes up a large fraction of the household's typical expenditure (so f is close to 1), and the wage rises very little in the wake of the wheat price increase (so ε is close to 0) or the household garners little of its income from wage labor (so ω is close to 0), then the implicit tax on this household (associated with the wheat price increase) will be large in percentage terms. If, however, wheat takes up only a small fraction of the household's typical expenditures, the wage rises rapidly in response to the wheat price increases and wages are an important source of household income (so that $\varepsilon\omega$ is greater than f), then the household ultimately benefits from the joint increase in the food price and wage. Spending large fractions of their income on food, the poor tend to be particularly vulnerable to food price increases, but even among poor wage labor households the ultimate impacts of an increase in the price of wheat may differ greatly across socio-economic groups and places. The poor differ with respect to the importance of wheat in the their diet, the extent to which wheat price increases induce increases in local wages, and the extent to which they draw income from the affected labor markets (rather than from non-labor income or labor in markets largely unaffected by the wheat price).

Half the developing world's people, and three-quarters of those living on less than $2 per day, live in rural areas. Of the developing world's rural households, half operate small farms (World Bank, 2007). In very poor countries like Malawi, 90 percent of the population lives in rural areas and nearly all of them operate small family farms. Farm households around the world are highly diverse. They may own vast plantations or rent tiny parcels of land, and they cultivate crops as diverse as rice (a food crop often raised in artificially flooded fields), cotton (an industrial input grown in dry areas, dependent on seasonal rainfall), and coffee (an export crop harvested from trees). Some run their farms as commercial enterprises, entering into sophisticated contracts in output, input and labor markets, while others subsist by cultivating their own food, having very little contact with markets. For some the farm is their only source of income, while others also operate non-farm enterprises and work for wages in agricultural or non-agricultural occupations.

Farm households engage simultaneously in decisions regarding consumption of goods and services, labor supply *and* agricultural input use and production. Unlike "consumers", "labor suppliers", "producers," and "wage labor households", farm households face choices about **market participation**. Because they both produce *and* consume food, they may sell little or none of the food they produce, and may buy little or none of the food they consume. In Mozambique, for example, while 94 percent of rural households operate land, only 29 percent sell any crops (Heltberg and Tarp, 2002). Similarly, farm households both supply *and* demand labor. They may hire little or none of the labor they employ on their farm, and may hire out little or none of the labor they supply. Some households – often referred to as **subsistence** farm households – rarely engage in any market at all, instead simply devoting their labor time to cultivating their own farms, and consuming what they produce.

In what follows we define terms for describing farm households' participation in markets, develop tools for analyzing how diverse farm households are affected by changes in market conditions, and demonstrate how a farm household's behavior can prove surprising when it does not participate in one or more markets. Table 7.2 lists the new variables that become relevant in the discussion of farm households. (The variables of Table 7.1 will also be employed.)

Table 7.2
Additional Notation Employed in Discussion of Farm Households

Q_a = production of farm product a in kilograms
F_a = consumption of farm product a in kilograms
NMS_a = net marketed surplus of farm product a
NLS = net labor supply in hours
FS_a = farm sales of farm product a
FP_a = farm purchases of farm product a
LHI = labor hired in
LHO = labor hired out
C = chemical fertilizer (or other purchased input)
q = price per unit of chemical fertilizer

Net marketed surplus and net market labor supply. Depending upon whether a farm household's production of a particular farm product like corn or milk exceeds or falls short of its consumption, the household may be *either* a seller or buyer of that item.[1] Letting Q_a represent the farm household's production of a product such as corn and letting F_a represent the household's consumption of that good, we will define the household's **net marketed surplus** of the good, NMS_a, as:

(7.4) $NMS_a = Q_a - F_a.$

If this takes a positive value, the household sells some of what it produces in the market. If it takes a negative value, the household buys some of what it consumes in the market. Similarly, letting L denote the total quantity of labor the farm household employs in cultivating its farm (including both family and hired labor), and letting S denote the total quantity of labor the farm household supplies to any kind of work, we define the household's **net market labor supply,** NLS**,** as

(7.5) $NLS = S - L.$

Negative values indicate that non-family labor is hired in through labor markets to help cultivate the family farm, and positive values indicate that family labor is hired out through labor markets. Note that even within the class of farm households some may be buyers of various foods while others are sellers of those foods, and some may be employers while others supplement their farm earnings as employees.

It will sometimes be useful to refer to **Farm Sales** of a good (FS_a) and **Farm Purchases** (FP_a), non-negative quantities which are defined as

$$\begin{aligned} FS_a &= Q_a - F_a && \text{if } Q_a > F_a \\ &= 0 && \text{if } Q_a \le F_a, \text{ and} \end{aligned}$$

$$\begin{aligned} FP_a &= F_a - Q_a && \text{if } F_a > Q_a \\ &= 0 && \text{if } F_a \le Q_a \end{aligned}$$

and which thus satisfy

(7.6) $NMS_a = FS_a - FP_{a..}$

Similarly, we can define **Labor Hired In** (LHI) and **Labor Hired Out** (LHO) as

$$\begin{aligned} LHI &= L - S && \text{if } L > S \\ &= 0 && \textit{if } L \le S, \text{ and} \end{aligned}$$

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[1] In reality, their relationships with markets may be even more complicated. They may sell food in some seasons of the year and buy foods in other seasons. Given space limitations, we ignore such possibilities in this chapter.

$$LHO = S - L \qquad \text{if } S \geq L$$
$$\quad = 0 \qquad\qquad \text{if } S \leq L,$$

with

(7.7) $NLS = LHO - LHI.$

Impacts on net marketed surplus and net market labor demand of changing circumstances. To understand how changes in prices, wages and other socio-economic circumstances affect a farm household's involvement in markets, as indicated by its *NMS* for various products and *NLS*, we must consider the impacts on both production *and* consumption, and on both labor demand *and* labor supply. An increase in the price of corn is likely to motivate an increase in corn production, but the associated increase in farm profits and thus farm household income might stimulate a simultaneous increase in the household's corn consumption, rendering ambiguous the sign of the ultimate impact on corn *sales.* Thus while a pure profit maximizing agricultural producer would always increase corn sales in response to a corn price increase, a farm household may not.

Endowments and allocation choices. A farm household is endowed with land, fixed factors of production and a technology for agricultural production, as well as total time *T* and possible non-labor income *M*. *Like a producer* it must allocate its land and fixed factors to production activities, which also involve the use of labor *L* and possibly purchased inputs like chemical fertilizer, *C*. *Like a labor supplier*, it must allocate its time *T* across income-generating work (*S*) and home time (*H*). *Like a consumer* it must allocate any resulting income (including non-labor income, farm income and labor income) across the consumption of goods and services.

The household may produce multiple farm products, including both **food crops** like rice, which may be of interest for both own consumption and sale, and **cash crops** like cotton, which are of interest only for sale. The goods the household consumes may include **farm products** that the household is capable of producing for itself, as well as **non-farm products.** Of the goods markets potentially relevant to a farm household, then, a household may be interested in some only as buyers, in some only as sellers, and in some as possible buyers or sellers. To allow simply for some diversity in the farm household's relationship to different product markets, let's let F_a and F_b stand for the household's consumption of two goods and let Q_a and Q_b stand for its production of those two goods. For cash crops *F* must be zero and for non-farm consumer goods *Q* must be zero.

The first constraints that shape a farm household's possibilities and choices are the **production functions** that indicate the maximum quantities of crops it may produce given the quantities of inputs it allocates to their production. (See the introduction to production functions in Chapter 3, and the discussion of farm production decisions in Chapter 6, for more on agricultural production relations.)

In addition, the farm household faces an important **budget constraint**, indicating that its outlays of cash on the purchases of goods, fertilizer and labor must be no more than its

cash receipts from non-labor income and the sales of goods or labor. If the farm household faces a wage of w and prices p_a, p_b, and p_c for the two goods and chemical fertilizer, and if we (for the moment) ignore any costs of participating in markets, then we may write this constraint as

(7.8) $p_aFP_a + p_bFP_b + p_cC + wLHI = p_aFS_a + p_bFS_b + wLHO + M,$

where the left hand side accounts for all cash outlays and the right hand side accounts for all cash receipts.

We can gain insight into this household's allocation choice by re-writing (7.8), employing first (7.6) and (7.7) and then (7.4) and 7.5) to obtain

(7.9) $(p_aQ_a + p_bQ_b - p_cC - wL) + M + wT =) \ p_aF_a + p_bF_b + wH.$

The left hand side of (7.9) is this **farm household's full income**. The expression in parentheses is the farm profit we would calculate if we valued all its output at market prices (whether or not the household actually sells all its produce) and valued all the labor it uses on its own farm at the market wage (whether or not the farm household fills all this labor demand with hired labor). We can think of this **farm profit** as the cash value of the income flow the household derives from its endowment of land, fixed factors and technology. The other components of full income are the household's endowment of non-labor income and the cash value of the household's endowment of time.

The right hand side of this expression shows the three "goods" on which the household may choose to "spend" its full income: consumption of the two goods and home time (much the same as for the simple wage labor household discussed above). Each good is multiplied by the per-unit opportunity cost (or charge against full income) of consuming that good. The opportunity cost of consuming a unit of F_a is p_a, whether the household purchases the unit at price p_a or obtains the unit from its own production (in which case it sacrifices the ability to sell it for p_a). Similarly, the opportunity cost of any unit of F_b consumption is equal to p_b. As with the wage labor household, the opportunity cost of consuming home time is equal to the wage, which is the opportunity cost of that time whether the household withdraws the time from wage labor (sacrificing wage income of w) or from work on the household's own farm (reducing profits by the cost of additional hired labor w).

Effects on farm household purchasing power of changes in prices and wages. To gain insight into the taxes or transfers to farm households implicit in price and wage changes, we can re-write (7.8) or (7.9) yet again, to obtain

(7.10) $p_aF_a + p_bF_b = (p_aQ_a + p_bQ_b - p_cC - wL) + M + wS$

The left hand side is a measure of the household's **consumption expenditure,** in which we value everything the household consumes at market prices, even if the household actually obtains some of what it consumes from its own production. This is a measure of

consumption expenditure that treats consumption out of own production as food that the household "buys" from itself at market prices. The right hand side is the measure of the household's **actual income** (as opposed to full income) we would get if we value all units of farm output at market prices (even if some of it is consumed rather than sold), and valued all labor employed on the farm and all labor supplied by the household at the market wage (even if some labor does not pass through markets). This is a measure of income that treats all food it consumes out of own production as farm output it "sells" to itself and treats the family's labor on its own farm as labor input that it "buys" from itself at the market wage. The right hand side of (7.10) allows us to see actual income as the sum of farm profits, non-labor income and labor income.

We may now ask the question: If the household were to hold constant all its choices regarding production, labor supply and consumption, while experiencing price and wage changes, what gap would emerge between the consumption expenditure required to maintain current consumption (the left hand side of 7.10) and the household's income (the right hand side of 7.10)? If the price of the first good rises from p_1 to p_2, the consumption expenditure required to maintain the household's current consumption rises by $(p_2-p_1)F_a$. Notice, however, that the price increase also increases farm profits by $(p_2-p_1)Q_a$. If the wage rises from w_1 to w_2, then the household's labor income would rise by $(w_2-w_1)S$, but its farm labor costs would rise by $(w_2-w_1)L$. The incipient **purchasing power increase** of these changes is equal to the net increase in actual income minus the expenditure required to maintain current purchases, or

$$[(p_2-p_1)Q_a - (w_2-w_1)L + (w_2-w_1)S] - (p_2-p_1)F_a = (p_2-p_1)NMS + (w_2-w_1)NLS.$$

The right hand side expression makes clear that the sign of the impact of a crop price increase on purchasing power depends on whether the household is a net seller of that crop (in which case *NMS* is positive and the price increase boosts household purchasing power) or a net buyer (in which case *NMS* is negative and purchasing power falls). Similarly, if the household is a net labor supplier (so that *NLS* is positive) a wage increase boosts purchasing power, but if the household is a net labor demander (so that *NLS* is negative) the wage increase reduces farm profits and purchasing power. If the price of chemical fertilizer rose at the same time, this would reduce the farm household's purchasing power in proportion to its purchases of fertilizer.

Among farm households the net purchasing power effects of price and wage changes may be even more diverse than among wage labor households. If the price of corn rises by ρ percent, if each percentage point of increase in the price of food ultimately gives rise to an increase of ε percentage points in the wage (where ε is again the elasticity of the wage with respect to the price of food), if we let m indicate the ratio of the household's net marketed surplus of corn to its total consumption expenditure, and n indicates the ratio of the household's net labor supply to total consumption expenditure, then the approximate percentage change in the household's purchasing power is $\rho(m + \varepsilon n)$. Farmers producing corn and hiring labor out will tend to gain, especially in regions where corn price increases stimulate significant increases in labor demand and wages. Farmers that are net consumers of corn, perhaps because they cultivate cash crops, might lose, especially if

they are net employers of labor and wages rise as well. Subsistence farmers for whom *NMS* and *NLS* are zero will be largely unaffected by small changes in prices and wages.

The distribution of impacts will also differ between the short-run and the long-run. Poor farmers with little land, who produce some food but are net buyers of corn, and who earn a large fraction of their income working for wages in agricultural labor markets, will tend to be hurt in the short run by the higher cost of purchasing food, but increases in their wage income may eventually reduce or even reverse the purchasing power impact of the price increase.

Transfer costs and non-participation in markets. While wage labor households have no choice but to participate in markets for food and labor, farm households may choose either to participate or not in either kind of market, and many farm households in developing countries choose not to participate in at least one market. It is thus important to recognize that participating in markets is costly. Households incur **transfer costs** when they buy or sell, because it takes time and resources to travel to market, search out partners with whom to trade, and transport goods and workers. These costs may outweigh the potential benefits of engaging in market exchange, leading households to choose self-sufficiency rather than market participation. We will dig much more deeply into both the benefits of participating in markets and the transfer costs that might inhibit market exchange in the next chapter. Here we simply demonstrate how we might integrate transfer costs into the study of farm household behavior and well-being, and how their introduction leads to models in which farm household responses to change can be quite different from the responses we would predict on the basis of simpler theories.

A simple farm household model focusing on labor demand, labor supply and labor market participation in the presence of transfer costs. In order to make a few key analytical points while keeping things relatively simple, let's focus on a farm that produces only a cash crop and consumes only "food." Because it does not produce food, it always participates in the food market as a buyer. Because it does not consume any of the cash crop, it always participates in the cash crop market as a seller. The household may make diverse choices about participation in the labor market, however, because it both supplies and demands labor. Important to the analysis will be the assumption that hiring labor in or out is costly. Hiring labor out is costly because a member of the family must travel to market, find work, submit to the authority of a non-family boss, and for other reasons. Hiring labor in is costly because hired workers must be located and transported to the farm, and must be supervised. For convenience we will assume that all the relevant costs can be expressed in the same units as the wage.

Suppose w is the wage in the nearby labor market in pesos per labor hour, t_i is the transfer cost of hiring non-family labor in from the market expressed on a per-labor-hour basis and t_o is the transfer cost per labor hour of hiring family labor out into the labor market. Under these conditions, for any hour of labor the family hires in from the market, they incur the total cost of $(w+t_i)$ pesos. For any hour of labor the family hires out into the market, the family "brings home" a net wage of $(w-t_o)$ pesos. If the household hires labor

in ($L>S$), it spends $(w+t_i)LHI$ on hired labor. If the household hires labor out ($S>L$), it brings home $(w-t_o)LHO$ in net wage labor earnings.

Suppose this farm household produces a quantity Q of a cash crop, which it sells at a price of p pesos per unit, with low-skilled labor L as the only variable input. The household purchases F units of food in the market at a price of 1 peso per unit.[2] The household seeks to maximize its utility, $U(F,H)$, which is a function of only food consumption and home time (H). It chooses to supply a total quantity of labor (S) to any work (whether on the family farm or in the labor market). The sum of H and S must not exceed the total quantity of time available (T). It also receives non-labor income of M.

For the special case we have just described, the farm household's cash purchases constraint (7.10) becomes simply

(7.11) $F = pQ + (w-t_o)LHO - (w+t_i)LHI.$

The assumptions we have built into this simple model are convenient, because they imply that the household's entire set of decisions regarding consumption (F), labor supply (S) and production (Q and L) reduce to a simple pair of decisions regarding its demand for labor L (for working the farm) and its supply of labor S. Once we know L and S, we can figure out the values of all other choice variables through the use of simple identities. The production function tells us what Q must be once we know the value of L. This also tells us the households cash receipts from selling the cash crop, pQ. The choices of L and S together also determine the costs associated with LHI and the receipts associated with LHO.   Thus together they determine the household's food purchases and consumption, F (according to relation (7.11).

We may describe this household's decisions using a single diagram that focuses on the choices of labor supply (S) and labor demand (L). We will wish to distinguish the three configurations this diagram may take that are illustrated in Figures 7.1a, b and c. The horizontal axis in each panel of Figure 7.1 measures quantities of labor (whether L or S). The vertical axes are measured in pesos, which are useful for measuring the benefits and costs to the household of increasing labor supplies or labor demands, which all ultimately link up to the household's ability to buy food at one peso per unit.


Figure 7.1(a)   Figure 7.1(b)   Figure 7.1(c)

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[2] By setting the price of food to 1, we automatically cause all the other price and wage variables in the model to represent "real" changes in prices and wages relative to the price of food. This choice is also convenient, because with the price of food set to 1, the physical quantity of food consumed, F, is identical to the pesos spent on food, allowing us to use diagrams describing revenues and expenditures in dollar terms to help us understand the implications for real food consumption and utility.
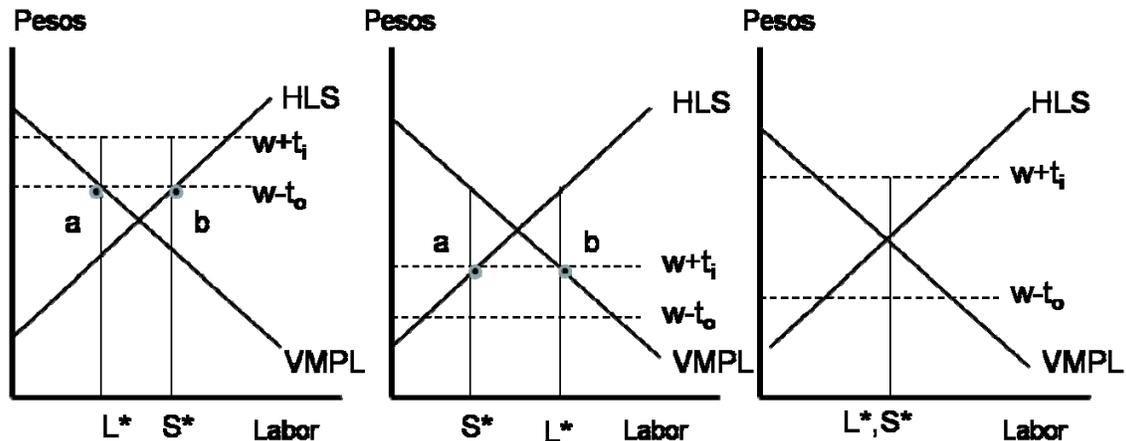
If the market wage is high enough, it pays to hire some family labor out, rather than employ it on the farm, even though is hiring out is costly.	If the market wage is low enough, it pays to hire some non-family labor in, rather than using more family labor, even though hiring is costly.	For intermediate values of the market wage, it does not pay to hire family labor out or hire non-family labor in.

We can think of the downward-sloping *VMPL* (value of the marginal product of labor) schedule in each diagram as the farm household's demand for labor, just as the *VMPL* schedule described the profit-maximizing farmer's demand for labor in Figure 6.6a. The *VMPL* is the marginal benefit (in terms of increased farm revenue, and thus cash for food consumption) to the household of putting more labor of any kind (family or market) to work in cultivating its farm. The upward-sloping household labor supply (*HLS*) schedule describes the cost to the household of giving up an additional hour of its time to any kind of work (on farm or in the market). Though the most natural way to think about the cost to the household of working is in "units" of discomfort associated with giving up home time, we may translate this cost into the peso terms indicated by the HLS schedule, by asking: "How many pesos they would have to be given to just compensate them for this additional discomfort?" This cost rises as the household supplies more labor, because home time becomes more precious as it becomes scarcer.

If the household had no access to labor markets, it would have to remain in **autarky** with respect to the labor market, neither buying nor selling labor. The quantity of labor it employs on its own farm (*L*) would have to equal the quantity of family labor it supplies (*S*). As we will explain, the household would maximize its utility at the intersection of its own farm labor demand (*VMPL*) and own household labor supply (*HLS*) schedules. Let's call the quantity of labor associated with this intersection the **autarky labor quantity.** The household would not want to devote less than this quantity to working its farm in autarky, because when using less than the autarky labor quantity the value of devoting an additional unit of labor to cultivation (*VMPL*) is greater than the compensation the household would require to give up another hour of home time (*HLS*). It can thus increase its utility by increasing the quantity of labor it devotes to cultivating its farm. This is true until the *VMPL* and *HSL* are equal, where utility is maximized. We'll call the height of the VMPL and HLS schedules at the autarky quantity the **autarky value of household labor**. It represents both the marginal cost to the household of working another hour and the marginal benefit to the household of using another unit of labor on the farm, when starting from its autarky labor quantity.

In the presence of labor markets, households might be able to improve their utility beyond what they attain in autarky by hiring labor in or out. The line drawn at the height $w\text{-}t_o$ describes the marginal benefit to the family of selling a unit of family labor in the market. The horizontal line drawn at the height $w+t_i$ indicates the cost to the household of hiring a unit of labor from the market. Notice that as long as t_o and t_i remain constant, an increase (decrease) in the market wage w would cause the $w+t_i$ and $w\text{-}t_o$ lines to rise (fall) by the same amount.

In Figure 7.1a the market wage w is sufficiently high (relative to the costs and benefits of labor use on the household's own farm) that both $w+t_i$ and $w\text{-}t_o$ lines lie above the intersection of the VMPL and FLS schedules. This household can improve its utility relative to its autarky utility by selling some of its labor, because at the autarky labor quantity the benefit to the household of hiring labor out ($w\text{-}t_o$) remains greater than the cost to the household of working another hour (the autarky value of labor). We thus know that the household can increase its utility by selling some labor. [We can also tell that the household will not hire any labor in, because at the autarky labor quantity the cost of hiring labor in ($w+t_i$) is greater than the benefit of using that labor on the farm.]

How much labor does the household in Figure 7.1a devote to cultivating its own farm and to working in the market? As long as VMPL is greater than $w\text{-}t_o$, the family adds more to income by using additional units of its own labor on the farm rather than in the market. Once the VMPL falls below $w\text{-}t_o$, any additional units of labor it supplies will be sold in the labor market. Thus we find the quantity of labor it devotes to own-farm cultivation at point a. Because own labor is the only labor employed on the farm, this tells us the utility-maximizing level of labor use on the farm, L^*. Any additional labor it wishes to supply will be supplied to the market. As long as the cost to the household of supplying more labor (the height of the FLS schedule) falls below $w\text{-}t_o$, the household increases its utility by supplying additional labor. We thus find the household's utility-maximizing supply of labor, S^*, at point b. Beyond this point the benefits of working fall short of the costs. The difference $S^*\text{-}L^*$ is the quantity of labor the household sells in the labor market (LHO).

In Figure 7.1b, the market wage w is sufficiently low that both $w+t_i$ and $w\text{-}t_o$ lines lie below the intersection of the VMPL and FSL schedules. This household can improve its utility relative to the autarky level by hiring some labor from the market to help cultivate its farm, because at the autarky labor quantity, the benefit of employing another unit of labor on the farm (VMPL) is greater than the cost of hiring that unit in. This household thus uses family labor only on the family farm, and supplements family labor by hiring in some market labor. As long as the FLS schedule lies below $w+t_i$, the cheapest source of labor for cultivating the farm is family labor. Beyond point a, the cheapest source of labor for the farm is market labor, thus the household's utility-maximizing level of family labor supply, S^*, is found at point a. Any additional labor employed on the farm will be hired from the market. As long as the VMPL remains above the cost of market labor, $w+t_i$, hiring additional labor adds more to farm revenues than to costs. The household's

utility-maximizing level of labor use on the farm, L^*, is found at point b. The difference L^*-S^* is the quantity of labor the household hires from the market (*LHI*).

The story of Figure 7.1c is quite different, where the intersection of the farm demand and family labor supply curves lies between $w+t_o$ and w-t_o. At the autarky labor quantity, the benefit of devoting more labor to the family farm just equals the cost of supplying additional family labor. Increasing its supply of labor to its own farm further would reduce its utility, because the addition to farm revenue (*VMPL*) would be too little to compensate for the cost of increased labor supply (the height of the *FLS*). At the same time, the cost of hiring labor in ($w+t_i$) remains above the benefit of employing the hired labor on the farm (*VMPL*), and the return to hiring labor out (w-t_o) remains below the cost to the family of working more. Thus neither hiring in nor hiring out is attractive. The quantity of labor the household supplies (S^*) and the quantity of labor it demands (L^*) are identical. The household chooses not to participate in the labor market.

We now have a framework in which to think about the forces that determine whether a farm household will sell labor, buy labor or decide not to participate in labor markets. All else equal (including the position of the *FLS* curve), having more and better land tend to shift the *VMPL* curve up, rendering it more likely that the intersection of the *VMPL* and *FLS* schedules will lie above the wage lines, leading the farm household to hire labor in. All else equal, having more able-bodied workers and fewer household responsibilities that give value to home time tend to shift the *FLS* curve to the right, rendering it more likely that the intersection will lie below the wage lines and the household will hire labor out. All else equal, increases in the costs and difficulty of participating in labor markets cause the gap between the ($w+t_i$) and (w-t_o) lines to expand, rendering it more likely that the household will choose not to participate in the labor market. Improvement in transport and communication infrastructure, or developments that bring active labor markets closer to previously remote communities reduce the gap, raising the potential for farm households to benefit from participation in labor markets.

Implications of non-participation for behavior. The behavior of farm households who choose not to participate in labor markets may be quite different from that of profit-maximizing producers (such as those examined in Chapter 6). Most obviously, while a profit-maximizer using labor as its only variable input would reduce labor demand and output supply in response to an increase in the wage, a small change in the wage has no effect on a farm household like the one in Figure 7.1c.[3] (Try demonstrating this.)

Less obviously, a household not participating in labor markets for the reasons described in Figure 7.1c may respond very differently to a change in the price of the cash crop, p. For a profit-maximizing producer employing low-skill labor as the only variable input,

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[3] This does not mean, however, that we should completely ignore the potential for such households to respond to changes in wages. If the wage were to rise enough, a household initially found in a situation like 7.1c could find itself in a situation like 7.1a, where it begins to hire labor out. Similarly, if the wage were to fall enough, the household might find itself in a situation like 7.1b, where it begins to hire labor in. The theory thus helps us to identify some forces that might cause isolated farm households to begin participating in markets.

this price increase shifts the *VMPL* curve up and to the right in Figure 6.6a, inducing an increases in the quantity of labor demanded and in total production of the cash crop. Compare this to what might happen if we increased the price *p* faced by a farm household in the situation described by Figure 7.1c. The solid schedules in Figure 7.2 are identical to those in Figure 7.1c. The direct impact of an increase in *p* is to shift the *VMPL* curve up and to the right, as illustrated by the dashed *VMPL* curve. The intersection of the *HLS* and *VMPL* schedules lies to the right of the initial intersection, indicating a tendency for labor employed on the farm, and total farm output, to increase. But this is not the end of the story. The increase in *p* implies an increase in farm profitability, and thus an increase in the household's full income. If home time is a normal good, then as profits and full income increase, the household's willingness to supply labor (at any level of compensation) falls, causing the *HLS* curve to shift to the left, as indicated by the light gray *HLS'* schedule. If the shift in the *HLS* schedule is great enough, household labor use and production may even fall. That is, by increasing the profitability of producing any quantity of the cash crop, thereby causing the household to demand more home time, the increase in *p* may cause the household to *reduce* its production of the cash crop (which now brings home more cash per unit)! And even if labor use and production rise, they rise by less than would have been predicted by profit maximization. This says that remote farmers with poor access to labor markets might rationally increase output little in response to price increases. If those same farmers had cheaper access to labor markets, the same price increase would stimulate a bigger supply response.[4]

Figure 7.2
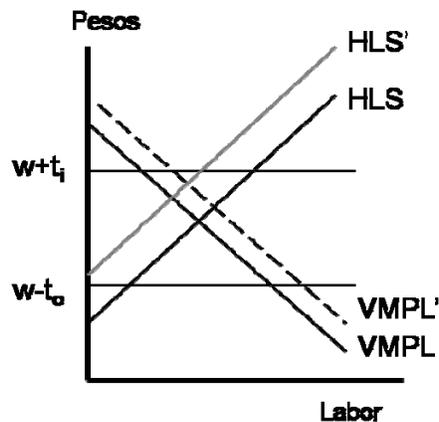
For a household that does not participate in the labor market, an increase in the price of the crop might cause its production of the crop to fall.

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[4] In the text we have examined the case of households that might fail to participate in the labor market. Another market in which they might fail to participate is the market for a staple food crop. Again, their non-participation in this market might cause them to react to an increase in the price of a cash crop in a very different way from that of a profit maximizer. The direct effect of the price increase is to encourage more production of the cash crop. But when the increased profits increase income, the household may wish to consume more of the staple food. This may require them to allocate more land to the food crop and less to the cash crop, causing cash crop production to rise by less or even decline (Fafchamps and de Janvry,…)

Non-farm enterprise households

Self employment is much more common in developing than developed countries. Given the importance of agriculture in many developing countries, it is not surprising to learn that farming – self-employment in agriculture – is common. But the high prevalence of self-employment extends far beyond the agricultural sector. Even in urban areas it is common for over one-third of the labor force to be self-employed or involved in a very small family business. In urban Vietnam, over 40 percent of men and over 60 percent of women are self-employed (FAO/UNDP, 2002). The businesses of the self-employed are highly diverse, from selling umbrellas on city streets, to performing free-lance carpentry, to operating small bakeries, to running larger family businesses. A very small number of the officially self-employed run large, modern firms with many employees. Most work on their own, with family members, or with just one or two employees.

Analytically, households running non-farm businesses are very similar to farm households, since they both supply and demand labor, and may both supply and demand the goods and services produced by their enterprises. Because the non-farm self employed are more likely than farmers to be located in towns, where they are closer to markets, they may tend to face lower costs of participation in some markets. Even so, they face costs of participating in labor markets that sometimes prevent them from hiring labor in or out (just as we saw was possible for farm households). For example, social norms and child care difficulties may render it more costly for women to work outside the home than inside the home in the family business, motivating family members to work only at home. The need to supervise non-family hired laborers more carefully than family members (who have a greater stake in the success of the business), raises the cost of hiring in, sometimes preventing the household from hiring outside workers to help in their businesses.

Effects on non-farm enterprise household purchasing power of changes in prices and wages. We may analyze the impact of market conditions on the purchasing power and well-being of non-farm enterprise households in much the same way we did for farm households. Whether or not non-farm enterprise households participate in labor markets, their well-being may be improved through increases in the prices of any good or service they sell and reductions in the prices of consumer goods and inputs they purchase. Increases in the local wage for workers of their skill level increase their well-being if they are net sellers of labor. Increases in wages for the skill levels of labor they hire reduce their well-being. Households with many assets for non-agricultural production, who are likely to employ other workers, are likely to lose from wage increases, while households with few assets for production, who are more likely to hire labor out, are more likely to gain from wage increases.

For non-farm enterprise households, especially those located in rural areas, increases in agricultural prices may affect them through multiple channels. Increases in the price of a food like corn reduce their purchasing power, with larger impacts the more corn they typically consume. For non-farm business households living in regions where

agricultural price increases boost local labor demand, wage increases boost their purchasing power if they are net labor suppliers, and reduce their purchasing power if they are net labor employers. They may also benefit through increased prices for the non-farm goods and services they produce, if they produce inputs for agricultural production (for which demand increases), or if they produce consumer goods purchased by farmers and farm workers whose incomes are rising. Non-farm households are thus more likely to experience improvements in purchasing power in the wake of agricultural price increases if they are located in rural areas and produce goods or services closely linked to agriculture. If the boost in demand leads them to expand production and employment, they augment the potential for rising agricultural prices to bring rising wages.

Incapacitated Households

Many of the poorest households in developing countries have little potential to generate income for themselves, either through wage labor or through the operation of farm or non-farm enterprises, simply because their capacity to supply labor to any work is very small relative to their needs. Their prime-age adult members may be disabled or absent, and the numbers of children, elderly, ill, injured or disabled per worker may be very high. Households headed by females and households in which grandparents care for grandchildren – whether as a result of divorce, violent conflict, HIV/AIDS or other causes – are often among the most vulnerable and incapacitated. Governments of several countries in Africa estimate that at least 10 percent of their populations live in incapacitated and poor households (Schubert, 2005).

We can think of such **incapacitated households** as special cases of wage labor households, whose total time endowments are very small or who face only very low wages for time spent in activities like begging. They may live almost entirely off non-labor income, in the form of gifts or loans from relatives, neighbors or charitable organizations. Like wage labor households they tend to be hurt by rising prices of the basic goods they consume. Unlike wage labor households, however, they tend to benefit little from rising wages for low-skill but physically demanding labor. While the capacitated poor may hope to gain from workfare programs that offer low wages for manual labor, and may hope to share in growth that brings rising wages for low-skill labor, the incapacitated poor will tend to be left behind by such policies and developments. How their well-being is affected when food prices and wages are rising may depend greatly on the nature of social institutions shaping charitable giving and responses to begging. If rising prices and wages increase the incomes of their capacitated neighbors, the incapacitated may share in the benefits if rising incomes render their neighbors more generous in charitable giving and in their responses to begging. (We'll return to these issues in Chapter 12.)

Application of Unitary Household Theories in Understanding the Poverty Impacts of Rising Global Food Prices

After gradually declining for 30 years, world market prices of major staple food crops shot up in the first decade of the twenty-first century. World rice prices experienced the most dramatic increases, rising over 250 percent from 2004 to mid-2008. Maize and wheat prices rose over 80 percent. Prices of meat, dairy and cash crops also rose, but not as rapidly.[5] During the same time period world fuel prices doubled or tripled, and the prices of some fertilizers nearly quadrupled (Heady and Fan, 2008).

According to the unitary household theories exposited above, a first step to take in analyzing the short-run impact of such price increases on the poor is to gather empirical evidence on the extent to which the poor are net buyers or net sellers of the goods whose prices have increased. Maros Ivanic and Will Martin (2008) use household survey data to characterize the distribution of net purchases and sales of wheat, rice, dairy, maize, sugar, beef and poultry across households in Bolivia, Cambodia, Madagascar, Malawi, Nicaragua, Pakistan, Peru, Vietnam and Zambia, and separately for rural and urban areas within each country. Using these data they asked questions of the form: If the world price of wheat rises 10 percent, and if we assume that wheat prices rise uniformly by 10 percent for all households throughout Bolivia, what would happen to the purchasing power of poor and near-poor households, and what implications would this have for poverty rates?

As we might expect, rising food prices increase poverty rates in urban areas, where the poor produce little food and are predominantly food buyers. Perhaps more surprising, however, in many countries the rural poor, too, are more likely to be net food buyers than net food sellers. Many of the rural poor live in landless households, earning their living by working for wages, and buying food. Others operate very small farms, mostly consuming what they produce and thus experiencing only small purchasing power improvements from rising market prices. Yet others operate small farms but also earn a substantial portion of their income in wage labor markets and are significant net food buyers. As a result, in many places rising food prices raise rural poverty rates, sometimes more than they raise urban poverty rates. An exception is Vietnam, where most rural households have some land and many of the rural poor are small commercial rice farmers.

The net effects of food price increases on poverty differ across crops and countries. In Bolivia, rising wheat prices increase poverty while rising maize prices reduce it. Rising rice prices increase poverty in Cambodia and Madagascar, but reduce it in Vietnam. In Uganda, locally grown staple foods such as matooke, tubers and potatoes are more important in the consumption and production of the poor than global grains, muting the impacts of global food prices on the poor there (Wodon and Zaman, 2008).

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[5] These figures pertain to dollar-denominated prices in major world markets (Heady and Fan, 2008). Changes in local currency prices varied across countries, both because some currencies appreciated more against the dollar than others and because some governments reduced taxes on agricultural commodities in an effort to restrain local price increases. For reasons we will discuss in Chapter 8, it is likely that prices also rose more in port cities that are well integrated into world food markets while rising less in remote rural communities that are poorly integrated into national and international markets. More information on patterns of price increases across geographic space would improve our understanding of the issues discussed in this section.

Overall, extrapolations from Ivanic and Martin's (2008) study suggest that the global net short-run effect of observed food price increases between 2004 and 2008 was to cause as many as 105 million people to fall below the $1 per day poverty line in real terms. Quentin Wodon and co-authors (2008) furthermore show that in many regions poverty impacts are even worse when using poverty measures other than the headcount ratio, which take into account reductions in living standards among the already poor, rather than looking only at the numbers of people falling below the poverty line. (See Chapter 5 on poverty measures.) In addition, Ivanic and Martin (2008) may over-estimate the positive impact of rising food prices on net food sellers for two reasons. First, where poor farmers use petroleum based fertilizers and these prices rose steeply, much or all of the beneficial effect of higher selling prices would have been undone. Second, rising fuel prices increased costs of transporting fertilizer to the farm and crops to market, also counteracting rising sales prices. In some cases the rising costs of participating in markets have led farmers to withdraw from markets (IFAD, 2008). Anecdotal evidence collected from around the world by the International Fund for Agricultural Development (IFAD, 2008) supports the conclusion that the purchasing power of the poor has suffered, causing many poor households consume smaller quantities and less expensive foods, eat less frequently, and withdraw children from school so that they can work and contribute to family income.[6]

Given that large numbers of the world's poor are net food buyers, must we conclude that developed country agricultural market liberalization, which would raise world food prices, would ultimately be bad for the world's poor? No, not necessarily, because the poverty reduction hopes of liberalization advocates are pinned on the longer run, in which higher food prices stimulate production by non-poor as well as poor producers in agriculture and in linked non-agricultural sectors, increasing the demand for labor and raising wages. If we wish to predict the longer-run impacts on poverty of the sustained increases in crop prices that would arise out of developed country agricultural liberalization, we must predict the extent to which increases in various crop prices will translate into wage increases, both in the medium run as farmers adjust their variable inputs, and in the longer-run as farmers invest in capital improvements and technological innovation.

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[6] It is also possible that Ivanic and Martin (2008) over-estimate the short-run effects of food prices on poverty when they assume that global food price increases are indeed transmitted to all poor households throughout each country. As we will see in Chapter 7, rural areas that are poorly connected by infrastructure to larger markets may remain largely isolated, with local prices determined by local supply and demand conditions rather than international market prices. Furthermore, even when local markets are integrated into larger markets, local prices may rise by less than world prices if the local currency depreciates relative to the currency (often the U.S. dollar) in which world market prices are denominated or if the local government responds to rising world prices by reducing local taxes on those items. Evidence on the extent of global food price transmission to local markets is sparse, but confirms that transmission is more likely in urban areas than in rural, and that the rate of transmission seems to differ greatly from place to place. The International Fund for Agricultural Development (IFAD, 2008) sent questionnaires to country program managers in 40 countries in late 2008. They found that in most places food prices had increased, but that in some places prices had doubled or even tripled, while in others they had risen only 10 percent.

Unfortunately, surprisingly little research has been directed toward estimating the elasticity of low-skilled wages with respect to agricultural price increases. The few estimates to date are not very optimistic. For example, Boyce and Ravallion (1988) estimated impacts of rice price changes (and other factors) on agricultural wages in Bangladesh, allowing for the effects to grow over time as households adjust their production and employment decisions. They found a short-run elasticity of wage with respect to rice price of 0.22 and long-run elasticity of .47, which is almost entirely unrolled within four years. Ravallion (1990) uses these estimates to calculate the impacts on poverty of rice price increases together with short- and long-run wage increases. Short-run wage effects are not enough to reverse the short-run increase in poverty associated with rising food prices. Long-run wage effects are only enough to roughly balance price effects, but not to reduce poverty.[7] This conclusion may be overly pessimistic, because farmers may be more inclined to increase production and employment in response to long-term price increases driven by liberalization than they are in the face of temporary price fluctuations captured in the Bangladesh data. Many observers also suspect that farmers' longer-run responses to rising prices are currently constrained in many countries by lack of improved technologies, lack of market infrastructure and lack of financing (Masters, 2008). This raises the possibility that rising food prices might lead to much greater expansion and poverty reduction if complemented by investments in agricultural research and extension, infrastructure and improvements in financial markets. We return to these issues in later chapters.

Our household model framework reminds us, however, that even if developed country agricultural liberalization ultimately leads to agricultural expansion and rising wages that improve well-being in the long run, many of the poor will bear serious costs in the short-run, and the incapacitated poor will fail to share in the benefits even in the long run, unless explicit efforts are made to increase flows to them through public or private safety net institutions.

Non-unitary household theories:
From simple maximization to cooperation and conflict

A motivation. Throughout the world women and girls are disadvantaged relative to men and boys (World Bank, 2001; Kevane, 2004). Almost everywhere girls are less likely to attend school than boys. In South Asia and China girls receive lower quality food, are less likely to receive health care when sick, and die at higher rates. Women often work longer hours than men (when hours spent in cooking, fetching water and other household chores are included in the calculations). They face more restrictions on their freedom, and enjoy fewer rights to own property. In some cases women are virtually bought and sold through marriage agreements arranged by men. Rural women who obtain access to

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[7] Even though wages rose only .47 percent for every 1 percent increase in the rice price, this was enough to neutralize the effect on poverty. Recall that the percentage reduction in a wage labor household's purchasing power associated with a one percent increase in food price is equal to *(f-εω),* using notation introduce earlier in the chapter. Because the typical wage labor household devoted less than half of its budget to rice purchases (*f*<.5), wage increases of less than half of rice price increases (*ε*<.5) were sufficient to set *f-εω,* even if almost all of their income was derived from wage labor (ω close to 1).

land through their husbands while married may lose that access upon divorce or widowhood. Such differences lead development analysts and policymakers to ask: How might policy help raise the status of women relative to men, allowing them to share, and even share disproportionately, in the benefits of development?

Additional observations raise a second question about women in development: How would efforts to raise the status of women affect the rate and nature of development? Development thinkers and practitioners increasingly believe that women put development resources to better use than men, being more likely than men to spend additional income on children's nutrition and education, and more likely to repay loans on time. If this is true, increasing women's share in current assets and income may lead to greater rates of growth in human and physical capital. But directing resources toward women also has the potential to reduce rates of growth: if men face more and better opportunities for employing resources productively, then diverting resources from men to women may decrease aggregate productivity. There is much we still do not know about the benefits and costs of targeting development resources to women.

Some of differences in the well-being of women relative to men arise because households headed by females tend to be poorer than households headed by men, but many of the disadvantages faced by women relative to men arise even *within* male-headed households. Parents choose to invest more in boys' schooling than in girls'. Wives in two-parent households often work longer hours and enjoy less autonomy than their husbands. Wives spend additional cash differently than their husbands would. Thus it appears that if we are to understand the forces that shape the relative standing of women, and the impacts of changes in women's relative standing, we must study resource use and the distribution of consumption *within* households.

As we discuss in the next section, while unitary household models offer some insights into gender differences within households, they fall far short of providing a compelling framework within which to answer the gender questions raised above. Two new classes of "non-unitary household models", exposited in subsequent sections, together point to a more compelling framework. The final section of the chapter applies this expanded body of theory to the study of gender and development policy.

Gender differences within unitary household models

Unitary households with diverse members. In unitary households (such as those modeled in the first half of this chapter) all decisions regarding resource use and consumption are made simultaneously, in an effort to maximize a single utility function. Unitary household theory may be used to analyze households with multiple members, but they assume either that the members behave as if a single "household head" makes all the decisions, or that all household members think alike and make unanimous decisions. What can we learn from such models about the causes and effects of differential treatment of males and females within households? To find out, let's imagine a simple unitary household containing husband, wife and children, in which the husband makes all decisions regarding the use of household land and other assets, decides how each

member's time will be allocated across activities and decides what each member will consume. Let's suppose the head knows how consumption and time allocation affect the "individual utility" of each household member, and makes choices that maximize "household utility", which is a weighted sum of the utilities experienced by all members. We remain agnostic about whether he gives equal weight to the utility of every member, or "plays favorites", giving greater weights to some members than others. (To see a mathematical formulation of such a model, see problem 2.) Let's point out three implications of this model that we may wish to question.

Intra-household inequality in treatment. First, the unitary household may choose to treat members unequally, but the way household members are assumed to participate in this inequality seems unrealistic, or at least incomplete. A unitary household may treat its members unequally for several reasons. Most obviously, the household head may place greater value (and thus greater weight in his evaluation of household utility) on his own utility or that of his sons than he does on his wife's utility or that of his daughters. More subtly, even if the head values all household members equally, he may realize that he can make everyone in the household better off by treating members unequally. For example, if male members can obtain higher wages outside the home than female members, then the household might achieve the best consumption opportunities by requiring that men work outside the home, while women produce valuable services within the home. Similarly, if men's work requires greater physical strength and stamina, then the household may attain higher shared living standards by letting men consume a larger share of household calories. While these reasons for unequal treatment within unitary models may be important, they ignore any potential conflict within the home over choices. According to this model, when women and girls receive less, either they accept this because they have absolutely no voice and acquiesce to all household head decisions, or they are in full agreement with the household head that their unequal treatment is in the best interests of the household. A model that considers more nuanced possibilities, in which women may disagree with men, and exercise at least some voice or autonomy, would be more compelling.

Income pooling. Second, in unitary models, a single decision-maker makes all resource use, time allocation and consumption decisions simultaneously, with regard to a single set of preferences and a single set of time and budget constraints. This implies that household decisions should depend only on *total* quantities of the household's assets, and the *total* quantity of income all household members bring in. Decisions should be unaffected by changes in the *shares* of assets or income streams belonging to male and female members. The unitary household head is said to **pool** assets before determining how to put them to use, and to pool income before determining how to divide it up to cover consumption for diverse household members. It is thus impossible for unitary household models to explain, or guide our study of, differences in the use of men's and women's income.

Efficiency of resource use within the household. Our unitary household decision-maker seeks to maximize a weighted sum of the utilities of individual household members. If the utility function he imputes to each household member is an accurate representation of

that member's true well-being, and if he gives at least some weight to each member, then his efforts to maximize family utility will require him to make efficient use of household resources. Resource use is **efficient** when it is impossible to improve resource use in any way that increases one members' well-being without reducing another's. We know the unitary household head's decisions must be efficient, because if resource use were inefficient, it would be possible for the decision-maker to increase the utility of one member without reducing the utility of others, and would thus be possible to raise the weighted average of members' utility that he seeks to maximize. If household decisions are indeed efficient, then any efforts to improve the lot of women and girls *must* come at the cost of losses to men and boys. We will see below that some alternative models of household decision-making question this conclusion.

Cooperative bargaining and other models of efficient collective decision-making

In a first set of non-unitary theories husbands and wives are assumed to engage in **cooperative bargaining** over how to use household time, land and other resources. These theories recognize that husbands and wives may differ in their preferences and thus in their perception of how to put household resources to best use. Husbands and wives recognize that cooperation in forming a family and coordinating their work allows them to increase their joint productivity through specialization or economies of scale, and creates the potential to enjoy qualities of life unavailable to the unmarried. Thus it should be possible to make both husband and wife better off than they would be if they were single. Husband and wife must bargain, however, over how the "surplus" created by their cooperation is divided between them.

Nash bargaining solutions. The bargaining process in which wives and husbands engage may be complex and subtle, and difficult to model directly. Bargaining theorists argue that it is nonetheless possible to gain insights into the implications of bargaining by taking an approach proposed by John **Nash** (1950). Nash sets out **axioms** or properties that one might plausibly suspect to characterize the outcomes of bargaining among rational individuals. He supposes these axioms are fulfilled and examines their implications. More specifically, he suggests that cooperative bargaining outcomes should satisfy five axioms. First, it should be impossible to raise the utility of one party without reducing the utility of the other, because rational parties to the bargain would not wish to overlook ways of improving the bargain for one without worsening it for the other. (Thus in Nash bargaining theories household decision-making is *assumed* to be efficient.) Second, the solution should leave each party better off than he would be if they failed to cooperate, because each party must have a rational reason to participate in the bargain. This suggests that each party's **fallback position**, or the utility he would derive if household cooperation broke down, should play an important role in shaping the ultimate bargain. Third, interest in fairness suggests that if the parties to the bargain are identical in preferences and opportunities, then they should be treated equally by the ultimate bargain. The final two axioms are more subtle.[8]

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[8] The last two axioms proposed by Nash are that changing the scale in which utility is measured (without changing the way the parties rank order outcomes) should not change the real nature of the ultimate

Nash proved mathematically that if a bargaining outcome satisfies his five axioms, then it is identical to the outcome that would be achieved if the two parties simply agreed to choose household asset use, time allocation and consumption allocations to maximize the product

$$(U_c - U_f) \ (V_c - V_f)$$

where U_c and V_c are the utilities of the husband and wife when they cooperate and U_f and V_f are their utilities in their fallback positions, which are the circumstances they would face if cooperation breaks down. (U_c and V_c are functions of the households consumption, time allocation and production choices. U_f and V_f are independent of household choices, but are determined by a wide range of socio-economic conditions that we discuss below.) That is, the bargain maximizes the product of the gains to cooperation experienced by the two parties. (Problem 6 at the end of the chapter explores the intuitive appeal of this result for a simple case.)

Fallback positions and bargaining power. One implication of Nash bargaining models is that any change in circumstance that increases the wife's fallback utility shifts the bargaining outcome in her favor. Having a stronger fallback position thus translates into greater **bargaining power**. This suggests that we might gain insight into the determinants of women's well-being by exploring the socio-economic conditions that might determine their fallback utilities. Some theorists interpret the parties' fallback utilities to be the utilities they would experience if the marriage failed and they divorced (McElroy and Horney, 1981). If this is the case, then the wife's fallback utility and bargaining power – and the household's ultimate decisions regarding consumption, labor supply and production – should depend on the assets that would belong to her after divorce, the wage labor opportunities to which she would have access, and a wide range of legal institutions and social norms shaping her economic and social treatment as a single and divorced woman. The more vulnerable she would be in divorce, the less "say" she will have in household decision-making during marriage. Other theorists interpret the fallback situation to be one of non-cooperation while remaining married, in which husband and wife meet their individual needs as best they can, using only the resources over which they have individual control, rather than cooperating to achieve full economies of scale and specialization (Lundberg and Pollack, 1993). In this case bargaining power may also depend on the wife's economic opportunities, such as opportunities for wage employment, even while married.

Bargaining power as a shifter of effective household preferences. The bargaining solutions satisfying Nash's axioms can be thought of as arising out of a husband's and wife's efforts to maximize a weighted sum of the their utilities, where the weights are functions of their fallback utilities or bargaining power. (This is not transparently obvious. For a mathematical demonstration, see problem 5 at the end of the chapter.)

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bargain, and that eliminating an option (for how to allocate the household's joint resources) that was not chosen should not change the bargaining outcome.

This characterization of their decision-making is useful, because it helps clarify the similarities and differences between decision-making by unitary and Nash cooperative bargaining households.

To bring out the contrast, let's focus on households composed of husband, wife and children, who for simplicity are endowed only with income (Y), which they must allocate across the purchase of "food" and "tobacco" (at prices P_f and P_t). Whether the household is unitary or engages in Nash bargains, it faces a budget constraint such as that depicted by the solid diagonal line in Figure 7.3. For a unitary household, the indifference curves I_1, I_2 and I_3 represent the single unchanging set of preferences that shape the household's choices. Legal changes that assure the wife greater asset ownership in the event of divorce have no effect on this solution. For a Nash bargaining household, however, the "indifference curves" I_1, I_2 and I_3 represent the household's more mutable "effective preferences", which reflect a weighted average of the preferences of the husband and the wife, where the weights are determined by their initial bargaining power.[9] If women place greater value on food relative to tobacco consumption, then divorce law changes that increase the wife's bargaining power may cause the household's effective preferences to shift to a new configuration illustrated by the indifference curves J_1, J_2 and J_3, leading to greater food consumption out of any level of income. Bargaining models thus introduce the possibility that household choices are influenced by economic, legal and social conditions that affect what life would be like for women in their fallback situations, even when they do not affect the household's current budget constraint.

Figure 7.3
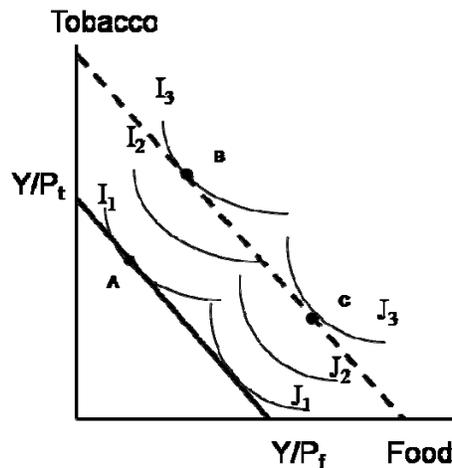
For a unitary household an increase in the wife's income shifts only the budget constraint. For a Nash bargaining household, it may also shift the household's effective "indifference curves."

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[9] The use of the label "indifference curve" for this interpretation of the diagram is convenient but makes poor use of the English language. Along any one curve the weighted average of the husband's and wife's utilities holds constant, but neither husband nor wife need be indifferent between the consumption combinations along the curve.

Differential impacts of transfers to men and women. Cooperative bargaining models also admit the possibility that targeting development program benefits to wives rather than husbands may increase their developmental impacts. Whether a household is unitary or engages in Nash bargains, the receipt of a cash transfer by either household member would shift out the budget constraint in the way illustrated by the shift from the solid to dashed budget line in Figure 7.3. For a unitary household whose unchanging preferences are described by indifference curves I_1, I_2 and I_3, the cash transfer would lead the household's consumption to shift from point *A* to point *B,* regardless of whether the transfer is given to the husband or the wife. For a Nash bargaining household in which the wife places greater importance on the consumption of food relative to tobacco, the cash transfer may not only shift the budget constraint, but also shift the household's effective preferences in the way illustrated by indifference curves J_1, J_2 and *J3*, leading consumption to shift from point *A* to point *C.* If the cash transfer had been given to the husband, the indifference curves might have stayed the same or shifted in the other direction. The transfer may thus have a bigger impact on food consumption if given to women rather than men, provided the receipt of the transfer indeed increases the recipient's bargaining power.

Efficiency. Simple Nash bargaining models share with unitary household models the implication that household resource use is efficient. Indeed, the first Nash axiom builds the *assumption* of efficiency into the model. This assumption is also retained in a more general class of theoretical models of household decision-making introduced by Chiappori (1992).

Perceived and True Interests. In a thought-provoking essay, Amartya Sen (1990) extends the cooperative bargaining framework to a situation in which the objective that women seek to maximize through bargaining (which we have called "utility") may differ from their true well-being, because their preference are socially constructed. Women's *perceived interests* may differ from their true or objective interests, because they have been raised to believe that men are more valuable than women, that men's contributions to the household (through income generation) are more valuable than women's contributions (through child care, water fetching and other unpaid tasks), or that a woman's only legitimate objective is one that places little weight on her own needs and wants. These beliefs may be self-reinforcing, if women living in male-dominated homes also believe they should not venture outside the home (where their beliefs might be challenged). Sen points to the tendency for women in some cultures to acquiesce to their own ill treatment, and even to participate in punishing other female family members who deviate from cultural norms, as evidence of the important role culture may play in reinforcing women's disadvantaged status.

When we allow for such a gap between women's perceived and true interests, it becomes possible to improve women's well-being by changing their perceptions. Something as simple as creating new motivations for women to meet with other women (for example, by creating opportunities for them to gather to learn about good nutrition) might ultimately improve their well-being, if the opportunity to sharing about their needs and wants with each other legitimizes them, leading the women to revise their perceived

interests to bear greater resemblance to their true interests. Similarly, improved wage employment opportunities for women may increase women's well-being not only through improved household income, and not only through raising their bargaining power, but also by bringing them into contact with new peer groups that re-shape their perceived interests.

Separated Spheres and Mental Accounts

Anthropological studies of household decision-making, especially in Sub-Saharan Africa, provide two reasons for discomfort with all household decision-making models described thus far. First, the models assume away any autonomous decision-making by wives and husbands, who are assumed instead to reach joint decisions about all consumption, labor supply and production choices. African men and women often seem to have clearly delineated spheres of activity in which they have autonomy (Kevane, 2004). In many parts of Africa, for example, farm households cultivate multiple plots of land, with some considered "men's plots" and others considered "women's plots," and with cultivation decisions on separate plots being made autonomously. Second, the models examined thus far assume that household members treat income as fully **fungible**, in the sense that any dollar of income – regardless of where it comes from – may be channeled into any use within the household. This is hard to reconcile with anthropological descriptions of the socially defined legitimate uses to which income from specific sources may be put in various African cultures. For example, in Cote d'Ivoire, social norms dictate that income derived from yam cultivation be devoted to expenditure on staple foods and education of children, while only income from men's and women's cash crops may be used for the purchase of items of more individual interest to adults, such as tobacco, jewelry or adult clothing (Udry and Duflo, 2003).

In light of these observations, we may wish to build models of household decision-making in which cultural norms dictate the **spheres** of decision-making in which husbands and wives have autonomy and the **mental accounts** that limit the fungibility of income by defining limited lists of legitimate uses for income streams coming from specific sources. Norms may dictate that husbands have the authority to make decisions regarding the use of their own labor and the cultivation of their plots and the disposition of the income from their plots, while also having the right to demand that their wives devote some labor time to their husbands' plots. Norms may also dictate that wives have authority to make decisions regarding the cultivation of their own plots, the disposition of income generated by those plots, and the use of any time left over after fulfilling their obligations to their husbands.

In models of separate spheres and mental accounts, husband-wife interactions are characterized more by self-interested trade than by cooperation. A wife may devote extra time to working her husband's plots in exchange for the husband's increased contribution towards the purchase of household food. More subtly, a husband may offer additional income support without requiring his wife to work on his land, if by so doing he relieves her need to earn income to meet her needs for clothing (by cultivating her own plots or working for wages), thus freeing her up to devote more time to child care and food

preparation, which are of mutual interest. Hence the choices of wives and husbands remain inter-dependent.

Possible inefficiency. Social norms defining separate spheres and mental accounts might prevent resources from flowing to their highest value use, and lack of cooperation between semi-autonomous husbands and wives may compound the problem. For example, if the husband's agricultural plots are larger and higher in quality, efficiency may require that the wife devote some of her labor time to cultivating her husband's plot rather than her own. She may be reluctant to do so, however, even if her husband agrees to pay her for her time, because her husband retains control over the profits derived from his plots. Even though she may generate less household income by working on her own plot than on her husband's plot, work on her own plot might increase the resources *over which she has control* more than her work for her husband. The potential for such inefficiency in household resource use implies that it may be possible to improve the household's total consumption possibilities by changing legal and social norms in ways that redistribute resources (like high quality land) from the husband's sphere of decision-making to the wife's.

Application of Non-Unitary Household Theories to the Study of Gender in Development

Unitary household models point to just two difficult ways in which outside actors might try to improve the relative treatment of females within households. First, outside actors might try to persuade male household heads to place greater weight on their wives' interests when making decisions. Second, outside actors might work at improving the labor market opportunities that families expect girls to face in the future, with the aim of increasing the return on investments in girls' human capital. Because unitary models imply that household decision-making is always efficient, they also imply that any successful efforts to improve the relative treatment of women will reduce the well-being of men within households.[10]

Non-unitary theories of household decision-making greatly expand the array of ways in which outside actors might seek to improve the relative treatment of women and girls, and open new possibilities regarding the impacts of such efforts on efficiency. Unlike unitary models, non-unitary models provide possible justification for targeting women as the recipients of relief and development program benefits. Such **gender targeting** has no justification in unitary models, in which decision-makers pool resources from all sources before deciding how to use them. Within non-unitary models, directing cash transfers, microloans or agricultural extension visits to women rather than men within male-headed households might improve women's relative treatment. Unfortunately, the models offer no guarantee that simply making women the official beneficiaries of development programs will have the desired effects. A woman might, for example, attend meetings as the official beneficiary, without enjoying increased bargaining power and without the program resources being credited to her household "account". Women might simply

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[10] Efforts to eliminate discrimination in labor markets might improve efficiency of resource use within labor markets, but not within households.

bring program resources home to their husbands, who then proceed to use them just as they would have had they been the official recipients. Whether gender targeting efforts have the desire effects is thus a matter for empirical study.

Empirical evidence on the impacts of gender targeting is accumulating, as cash and food transfer programs around the world experiment with efforts to designate program benefits as belonging to women. They require women to collect the payments, and sometimes require them to attend meetings with other women, and receive training that might boost their bargaining skills and confidence. Mexico's Progresa program requires women to meet together to collect payments and attend health lectures. Focus group discussions with beneficiaries suggest that the program has modestly expanded women's horizons and increased the share of household income over which they have control (Adato, et al., 2000). Schady and Rosero (2007) make clever use of data from a cash transfer program targeted at poor women in Ecuador to argue that female-targeted transfer programs indeed affect resource use by re-shaping interactions between males and females within households. They show that among households headed by males, households participating in the program spent larger fractions of their income on food compared to households in non-program communities (holding level of total income constant), but that this difference between program and non-program households was absent among households headed by women. This set of results is consistent with the hypothesis that the program gives more say to women within male-headed households, and women place greater relative value on household food consumption than men.[11]

Household models of all sorts warn program evaluators that gender targeting may bring women unintended costs as well as benefits. If women must devote time to fulfilling their new roles in development programs, but retain all their usual household work responsibilities, the total number of hours they must work may rise. If women must travel away from home alone to participate in the program, they may be exposed to danger, cultural disapprobation or resistance from their husband. Whether the benefits for women of gender targeting exceed the costs is an empirical question, on which only a small body of research has yet shed light. Progresa recipients confirm that their total time commitments rose with program participation, but are nonetheless pleased with participating in the program (Adato, et al., 2000). Anecdotes suggest that in a few cases micro-credit programs targeted to women have raised rates of domestic violence toward women.

Within non-unitary models even seemingly gender-neutral policies may have differential impacts on men's and women's well-being. For example, food subsidies may channel more benefits into women's spheres of decision-making than cash transfers, regardless of whether the program requires women to be the official beneficiaries. And, in a world in which culture dictates that domestic food crops are "women's crops" and export crops are "men's crops," agricultural research and extension programs that focus on food crops may channel more benefits into women's spheres than comparable efforts focused on

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[11] In Chapter 20 we will examine additional concerns related to the targeting of cash and food-based transfers, including the question of whether programs can effectively target additional food to specific individuals (such as school children) within households.

export crops. Thus understanding how and why men's and women's activities differ may shed important light on how to craft general policies that are more inclusive of women. Research on the determinants of men's and women's spheres is only in its infancy, and policy impacts may be quite surprising. For example, in some cases where food crops have become more lucrative, norms and institutions have changed to limit women's participation in those sectors (Kevane, 2000).

Non-unitary models encourage richer thinking about efforts to use persuasion and education to improve the treatment of women within households, and encourage deeper study of the social and legal institutions that shape household decision-making. Rather than focusing only on convincing male household heads to place greater weight on their wives' interests, it may be important to re-shape the way women perceive their own interests; and persuasion and education efforts may have greater potential for success when aimed at joint changes in norms within entire communities, rather than at behavior changes only in targeted households. Non-unitary models also raise interest in learning how to reform property rights regimes to give women greater control over land within marriage and greater retained access to land in the event of divorce, or better protection by laws regarding child custody, child support and remarriage.

In addition to expanding the range of possible methods for increasing women's control over resources, some non-unitary household models also raise new questions about the impacts of such efforts on efficiency. According to unitary and cooperative bargaining models, household decisions are always efficient. They thus imply that any improvements in the well-being of women and girls come at the expense of reduced well-being for men or boys. In separate spheres and mental accounts models, however, household decision-making need not be efficient. Relaxation of cultural constraints on women's access to resources may thus be useful not only for improving their relative status, but also for eliminating inefficiency and speeding growth.

A provocative example of inefficient gender bias is found in Udry (1996), who compares the cultivation of women's and men's plots within 150 very poor households in Burkina Faso. Because each household cultivates multiple plots (the median number is 10) and because it is common for the husband and at least one of his wives to cultivate the same crop on at least some of their plots, it is possible to compare yields in the same crop on comparable plots controlled by men and women within the same household. If agricultural land were being employed efficiently, then labor, fertilizer and other variables inputs to cultivation should be allocated across men's and women's plots such that the marginal product of any variable input is identical across plots.[12] This implies that if men and women employ the same agricultural technology on plots with comparable productive characteristics, they should employ the same quantities of inputs per acre and should obtain the same yields. In the Burkina Faso households, however, yields were 30 percent lower on women's plots than on men's plots. Almost all fertilizer

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[12] Drawing on the discussion of unequal marginal products in Chapter 3, if the marginal products are not equal, then moving variable inputs from plots on which the marginal product is lower, because more inputs are employed there, to plots on which the marginal product is higher, because fewer inputs are employed there, would increase total product, profits and household income.

was used on men's plots, and men's plots received greater inputs of hired labor and child labor. Udry calculates that household income could have been increased by 6 percent if inputs had been re-allocated optimally away from men's plots toward women's. He speculates that this inefficiency arises because women, whose control over land and access to income is tenuous, may be reluctant to encourage more use of the husband's labor and fertilizer on her plots out of fear of losing control over the land. Finding ways to secure women's control over land or increase collaboration within households might thus open the door to substantial increases in productivity and income.

Moving Forward

In Chapters 6 and 7 we have developed important tools for analyzing the impacts of changes in market prices (and other socio-economic circumstances) on the choices people make, and for analyzing how shared changes in market conditions might lead to impacts on well-being that are highly differentiated across diverse groups of households and across men and women, boys and girls, young and old within households. It is now time to build upon these "micro" tools in the creation of tools for studying "meso-level" outcomes in markets and non-market institutions. In Chapter 8 we begin by examining domestic markets for goods and services.

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Questions for Review

1. What does the label **unitary** mean in "unitary household theories"?
2. What is a **wage labor household?** What are the endowments of the stylize wage labor household examined in this chapter? What choices does this household make? What constraints does this household face when making these choices?
3. Define the wage labor household's **consumption expenditure, income** and **full income**.
4. What do we mean by the **purchasing power reduction** (or purchasing power increase) experienced by a wage labor household as a result of changes in prices and/or wages?
5. The text argues that the net impacts of food price and wage changes on the purchasing power of a wage labor household is approximately equal to the expression $\rho(f- \varepsilon\omega)$. Carefully define ρ, f, ε and ω. Referring to this expression, discuss why and how the purchasing power impacts of price and wage changes might differ greatly across wage labor households.

6. Define the following terms as they relate to a **farm household**: **net marketed surplus, net market labor supply, farm sales, farm purchases, labor hired in** and **labor hired out.** What would it mean for a farm household to **participate in markets** a lot, a little or not at all?

7. Describe the endowments of a simple farm household. What choices must this household make? What are the constraints on these choices? In what sense must the farm household combined the choices of a "consumer", "labor supplier" and "producer"?

8. Compare and contrast **food crops** and **cash crops**, and **farm products** and **non-farm products.** For which of these are farm households interested in markets only as buyers, only as sellers, and possibly as both buyers and sellers?

9. Define the farm household's **consumption expenditure, income, farm profit** and **full income.**

10. The text argues that the net impacts of food price and wage changes on the purchasing power of a farm household is approximately equal to $\rho(m + \varepsilon n)$. Define each symbol in this expression. Referring to this expression, discuss why and how the purchasing power impacts of price and wage changes might differ greatly across households.

11. Define **transfer costs**, and the role they place in helping to determine which markets, if any, a farm household participates in.

12. Define the assumption underlying the graphical analysis of the decisions of a specific type of farm household depicted in Figure 7.1. What is the significance of the VMPL schedule? The HLS schedule? The two horizontal wage lines?

13. Suppose we use the graph to determine that the household chooses to demand L* of farm labor and to supply S* of family labor. What quantities of cash crop output and food purchases does the household choose?

14. Explain how to identify the utility maximizing levels of L* and S* in each of the three panels of Figure 7.1.

15. Explain what happens to the profit-maximizing levels of L*, S* and Q* when a farm household in the circumstances depicted by Figure 7.1c experiences an increase in the price of the cash crop.

16. Discuss similarities and differences between farm households and non-farm enterprise households when it comes to the analysis of their production, labor supply, labor demand and well-being.

17. What do we mean by **incapacitated households**?

18. Why are the incapacitated poor less likely to benefit from economic growth than the capacitated poor? Under what conditions might the incapacitated poor tend to benefit from economic growth?

19. Discuss what we know and can guess about the impacts of the sudden increase in global food prices that peaked in 2008 on global poverty in the short run and long run.

20. Give some reasons why individual household members might be treated differently by a unitary household decision-maker.

21. What does it mean to say that a unitary household decision-maker **pools** income?

22. What does it mean for household decisions regarding resource use to be **efficient**?

23. Models that treat household decision-making as a process of **cooperative bargaining** recognize that husbands and wives (or diverse family members more generally) have reasons both to cooperate and to engage in conflict. Why might there be benefits to cooperation? Over what do their interests conflict?

24. Describe the approach proposed by **Nash** to studying the outcomes of cooperative bargaining. Define **fallback position** and **bargaining power.**

25. Using a graph like Figure 7.3, explain why an increase in the wife's income might have a greater impact on food consumption than an increase of the same size in the husband's income.

26. What does the Nash bargaining model of household decision-making assume or imply about the efficiency of household decision-making?

27. Discuss the significance of Sen's distinction between women's perceived and actual interests for our understanding of efficiency and equity in household decision-making.

28. What does it mean for people to treat income as fully **fungible**?

29. What is meant by separate **spheres** of decision-making by men and women? What is meant by **mental accounts**?

30. Why might the existence of socially-defined spheres of decision-making for men and women and socially defined mental accounts cause household resource use to be inefficient?

31. Discuss the implications of non-unitary models of household decision-making for the study of how policymakers might improve women's relative status.

1. Consider a rural community composed of the following groups:
   - *subsistence farmers* who produce corn only for their own consumption, using no purchased inputs, and who neither buy nor sell labor
   - *wage labor households* who earn income only by working for wages (either in agriculture or non-agriculture) and who purchase corn
   - *small commercial farmers* who produce corn for their own consumption and for sale, using only family labor, and who do not sell any labor
   - *large commercial farmers* who produce corn for their own consumption and for sale, using hired labor, and who do not sell any labor
   - *non-farm enterprise households* who buy corn and sell non-farm services, and who neither buy nor sell labor
   - *incapacitated households* who beg from their neighbors, sometimes receiving gifts of food, and sometimes gifts of cash, which they use to buy corn

Discuss the likely effects of an increase in the price of corn on the well-being of diverse groups within this community.

2. Why might road improvements in a rural rice-producing area, which make daily travel between farms and town easier and cheaper, lead to an increase in the price elasticity of rice supply to the market?

3. Drawing on all models of household decision-making discussed in this chapter (whether unitary or non-unitary), brainstorm as long a list as possible of the ways in which a development organization might try to improve the relative treatment of women and girls within households.

Problems

1. Consider the three graphs in Figure 7.1, depicting three situations in which a farm household might find itself.

a. What assumptions are common to the three situations?

b. What assumptions differ across the three situations?

c. What does the HLS schedule represent? What would happen to the HLS schedule in any panel if the household's total time endowment (T) increased, perhaps because of the construction of a well that reduces time required for obtaining water each day. Explain.

d. Analyze what would happen in each of the three panels to the utility maximizing levels of S*, L* and Q*, and to the household's exports and imports of labor, as a result of the increase in the household's endowment of total labor time available (T).

e. What would happen to the HLS schedule if the household's endowment of non-labor income (M) increased? Explain. Please assume that home time is a normal good.

f. Analyze what would happen in each of the three panels to the utility maximizing levels of S*, L* and Q*, and to the household's exports and imports of labor, as a result of an increase in the household's endowment of non-labor income (M).

2. Suppose a farm household produces a quantity Q of a cash crop, according to the production function Q=G(L), where L is the total quantity of labor (whether family or hired) employed in cultivation. The household's utility is derived from consuming food, F, according to the utility function, U(F). It sells the cash crop at a price of p and purchases food at price of 1. It faces no costs of transacting in any markets, and may thus buy or sell labor in the labor market at the effective wage w. The household supplies a fixed total quantity of labor time S, which it may divide across work on the farm or in the labor market. Define LHI and LHO as in the text.

a. Write down an expression for the household's cash outlays (whether for consumption or purchase of labor input).

b. Write down an expression for the household's cash receipts (whether from sale of the cash crop or sale of labor in the market)?

c. The household's cash budget constraint dictates that the expression you wrote down for parts a and b be equal. Simplify that equality into one involving only F, L, Q, S, p and w, using identities (7.7) and (7.5) in the text.

d. The household must maximize its utility subject to the constraint you just derived and the production function constraint. Collapse these two constraints into one by substituting the production function relation $G(L)$ in for Q in your answer to part c.

e. Solve the problem of maximizing $U(F)$, with respect to choices of F and L, subject to the constraint you derived in part d. You may wish to simplify the problem by re-arranging the constraint of part d to derive an expression for F that you can substitute into the utility function for F. You must then maximize the resulting expression with respect to L. Write down the first order condition for the solution to this maximization problem.

f. Show that the first order condition you derived in part e is the same as the first order condition that would describe the choice of L of a profit-maximizing farmer who produces a quantity of cash crop Q according to the production function $G(L)$, when facing a price p for the cash crop and a wage w for labor.

3. Consider a household composed of a husband and a wife. The husband cares only about the household's tobacco consumption, T, and obtains utility of $U(T)$. The wife cares only about the household's food consumption, F, and obtains utility of $V(F)$. $U(F)$ and $V(T)$ are both functions with positive first derivatives and negative second derivatives. The husband brings into Y into household, while the wife brings in income Z. The husband is the household's sole decision-maker, who maximizes the simple sum of his own and his wife's utility: $U(T)+V(F)$, subject to the budget constraint $pT+qF=Y+Z$, where p and q are the per-unit prices of tobacco and food. Show that the household pools income by showing that the effect on household consumption choices of an increase in Y is the same as the effect on consumption choices of a comparable increase in Z.

4. A husband and wife would produce incomes Y_h and Y_w in their fallback situations. If they cooperate they produce $Z>Y_h + Y_w$. They engage in Nash cooperative bargaining to determine how to allocate Z across the consumption of the husband, C_h, and consumption of the wife, C_w, subject to the budget constraint that $C_h + C_w = Z$.

a. Derive expressions for C_h and C_w as functions of Z, Y_h and Y_w. (Hint: You may wish to substitute $Z-C_h$ in for C_w in the maximand. You may then maximize the resulting expression with respect to C_h alone.)

b. What do C_h and C_w equal if $Y_h=Y_w=0$?

c. What do C_h and C_w equal if $Y_h=Y_w$ (but this quantity is not equal to zero)?

d. The surplus associated with cooperation is $S=Z-Y_h-Y_w$. Show that each spouse consumes his or her fallback income plus half the surplus in the Nash cooperative bargaining solution.

5. Suppose a husband's fallback utility is A, and his wife's fallback utility is B. Under cooperation they generate a total income of Z, which they divide between the husband's consumption, Y_h and the wife's $Z-Y_h$. The husband's and wife's utilities are $U(Y_h)$ and $V(Z-Y_h)$. Let $U'(Y_h)$ and $V'(Z-Y_h)$ denote the first derivatives of the two utility functions. Assume each utility function has positive first derivative and negative second derivative, reflecting positive but diminishing marginal utility.

a. In the Nash cooperative bargaining solution for Y_h, what is the ratio $U'(Y_h)/ V'(Z-Y_h)$ set equal to?

b. If the household instead maximized the simple weighted sum of utilities $U(Y_h)+wV(Z-Y_h)$ with respect to Y_h, what would the ratio $U'(Y_h)/ V'(Z-Y_h)$ be set equal to? [This shows that Nash cooperative bargaining yields the same solution as if the household were maximizing a weighted sum of the two parties' utilities, where the weight w is a function of the two fallback utilities.]

c. According to your results for part a, if A rises, what happens to the "weight" given to the husband's utility? What happen to Y_h?